PRESIDENTIAL ADDRESS

Some Future Work for the Entomologist in Hawaii

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With this, our 335th meeting, The Hawaiian Entomological Society concludes its 29th year as an active organization. Thanks to the generosity and foresight of the trustees of the Hawaiian Sugar Planters' Association in materially helping to finance the publication of our Proceedings, we have reached our 8th volume of printed matter and can justly look with pride to the achievement. Our present active membership includes individuals professionally employed in economic, museum, quarantine, teaching and survey work, several men engaged in other business and a number of retired entomologists whose enthusiasm for the work goes on with unabated ardor. In the particular work each may be concerned with, this multiude of published records on almost every detail of work in Hawaii for 29 years offers facts which unquestionably further his efforts in the puruit of knowledge, whether it be for the advancement of his economic work, for historical purposes, pure science, or for pleasure. Let us hope the printing of these records may continue.

Though our island group is a small one, with a total land area of about 6449 square miles, of great isolation and with an exceptionally limited insect fauna, each year shows no diminution in the amount of entomological work done. New immigrant species continue to appear in our midst and new endemic species are frequently added to our list. With the paucity of our native fauna and the great strides accomplished in the biological control of many of our worst immigrant pests, the feeling has been expressed in some circles that an entomological holiday is in order in Hawaii; that this branch of zoölogical science has been pushed far enough and that present costs are not in keeping with the returns. In anticipation of the growth of such a sentiment, the present subject has been chosen.

As years pass and commerce and human populations increase, transportation facilities will improve both in speed and quantity. The need for entomological service in Hawaii will then be greater rather than less. More trained men than we have today will be necessary if we expect to retain the beauty of our ornamental trees, shrubs and other plants, and continue the magnificent record with our major agricultural crops. Our geographical position with consequent small insect fauna clearly accounts for our blissful but precarious state, as has been frequently explained by entomologists in the past. There are few tropical or semitropical places in the world today, if any, where an immigrant insect has such an excellent opportunity to run rampant as in Hawaii, providing ecological conditions are suitable for its existence. The richness of parasitic and predatory enemies, together with other checks both bacterial and fungous, which are operative against insect life in most other tropical parts of the world, offer possibilities of at least partial protection to the tropical planter against devastating uprisings of imported pests. Such factors of protection, natural to Hawaii, are by comparison few in number. Many cases could be cited to illustrate this point. We select two. Our sugar cane leaf hopper *Perkinsiella saccharicida* Kirk. does not occur in Fiji. Should it ever reach there it would undoubtedly be held in check by the native enemies of the Fiji leafhopper *Perkinsiella vitiensis* Kirk. In fact our most effective leafhopper enemy *Cyrtorhinus mundulus* (Bredd.) was imported in quantity from Fiji in 1920. Our imported root grub *Anomala orientalis* (Waterh.) is not known to occur in the Philippine Islands. Should it ever reach there it would be immediately subject to attack by the parasitic wasp *Scolia manilae* Ashm., which is native to the Philippines and parasitic on native beetles related to *Anomala orientalis*. We have brought *S. manilae* from the Philippines and successfully used it against *Anomala orientalis* even though the latter was not its host there. These are simple cases; but they offer definite proof of our point.

A wise legislative policy, based on the belief that a rich native fauna presents an element of natural defense of large value, came to the speaker's attention during a sojourn on the Malay Peninsula in 1930. This region, one of the richest on the earth in fauna and flora, has from financial necessity but moderate protection through

quarantines against the importation of new pests. The geographical position of the Federated Malay States renders the maintenance of effective quarantines exceedingly difficult and costly. In considering the whole aspect of plant quarantine in 1930, the broad protection already operative through the presence of an enormously rich fauna was fully recognized. The realization of this natural asset in the control of immigrant pests plus the application of the limited funds available for quarantine service where most logically protective, has resulted in little or no waste in money and to date we have heard of no new insect visitation arriving to harass their crops. Such natural protection has never been Hawaii's lot and the entomologist will be required to stem the tide over and over again in the future as new pests arrive and new parasites and predators of these pests are required.

The maintenance of a local plant quarantine force will always remain of great importance to the welfare of the community. As stated above few if any countries offer so suitable a field for unrestrained development of imported insects as does Hawaii and consequently an efficient plant quarantine service is of prime importance to the Territory at all times. More men actually trained in entomology will be required on this force in the future. The excellent service rendered in the past, the improvement in the regulations pertaining to plant and soil importations and the coöperation offered by the steamship companies has done much to keep out or delay the arrival of new pests; but still they slip in in spite of the many precautions. The annual list of immigrant insects not hitherto recorded in Hawaii as prepared by Mr. Swezey each year, is impressive proof of what we may expect in the future. The next arrival of an insect with potentialities for destruction comparable to some of our spectacular immigrants of the past such as the Mediterranean fruit fly (*Ceratitis capitata* Wied.), the melon fly (*Bactrocera cucurbitae* [Coq.]), the sugar cane leaf hopper (*Perkinsiella saccharicida* Kirk.), the sugar cane beetle borer (*Rhabdocnemis obscura* [Boisd.]), the Anomala beetle (*Anomala orientalis* [Waterh.]), or the rose bettle (*Adoretus sinicus* Burm.), will probably be attended by a call for more entomologists on the quarantine staff in an effort to strengthen it and perhaps for more men suitable for parasitic work in foreign countries. Such a demand will be justified in view of the benefit already

derived from the introduction of foreign parasites of the above pests and the possibility of preventing the arrival of further pests through the development of a still more effective department of quarantine. There can be few countries that need plant quarantine protection more than the Hawaiian Islands. From the economic viewpoint it is the most important entomological work ahead of us.

The Pacific Entomological Survey, inaugurated some five years ago, has amassed invaluable data on the insects of the Marquesas Islands. The many manuscripts by world specialists on the various groups of insects collected by the Survey are in process of publication by the Bishop Museum, where the collections are deposited. Most of our insect problems have had their origin in the Pacific or in adjacent countries. Advance knowledge of the insect faunas of the Pacific Islands, where so much is yet to be discovered, forewarns and forearms us in the regulation of our quarantines and in the search for beneficial insects. The more we know of the insect faunas of the Pacific and their geographical distribution the less blind are our efforts in biological control work. The endeavors of the plant inspector can also be more intelligently directed. The Marquesan survey has been an excellent beginning. Many years more of work of this nature should follow until the other principal island groups of the Pacific have been at least roughly surveyed. The field is a rich one. Many entomologists of Hawaii in the future should have opportunity to penetrate some of these regions and make further contributions to the work so well started.

Owing to the specific nature of the work conducted by most of the entomologists in Hawaii today, little attention can be given to the many insect problems, large and small, that confront the average citizen in his household and garden. During the present year a record has been kept of the various requests for advice and help on matters outside the sphere of service for which the speaker and his fellow staff members are employed. Attention to most of these is time-consuming and generally insufficient to be entirely satisfactory. Such service can and often does interfere with one's regular duties. This is no doubt the experience of many entomologists whose entire time is taken up with special problems. Among the many requests for help on miscellaneous subjects the following may be listed:

Prenolepis longicornis Latr. This ant, which we commonly call the "crazy ant," occasionally occupies houses in such quantity as to cause great annoyance. Sweetened arsenic syrups have been found useful against it but considerable supervision is necessary in its preparation and applicaion.

Termites (*Coptotermes formosanus* Shiraki and *Cryptotermes piceatus* Snyder). We are frequently asked to examine buildings, furniture, etc., which are damaged, often beyond repair, by these two termites and, simultaneously, effective remedies are demanded. Much can be done towards alleviating the trouble and with the intelligent application of remedial measures results can often be entirely satisfactory. This can only follow after a careful study of each case. Much valuable service to the general public has already been rendered by several members of this Society on termite control; but the field is a large one and should ultimately fall within the realm of entomologists whose employment specifically includes termite control as a regular duty.

Cockroaches (*Diploptera dytiscoides* [Serville], *Periplaneta americana* [L.], *Blatella germanica* [L.] and others.) Some of the roaches which thrive indoors in Hawaii often cause much concern amongst local householders and complaints are not infrequent. A number of standardized methods of control have been found to have merit here but there is plenty of room for improvement. The so-called "beetle" roach *D. dytiscoides* notoriously disfigures our cypress trees by eating the bark from the young branches, often giving them a dead appearance over much of their leaf area. We have no satisfactory method of checking this damage as yet. Here is an entomological problem well deserving attention.

Silverfish (*Lepisma saccharina* Linné and probably one or two others). Book bindings, starched clothes, papers, etc., are often damaged by these insects. There is a considerable field for research in the development and practical application of traps, lures and poisons for use against such pests.

Cat Flea (*Ctenocephalus felis* [Bouché]). During May and June of the present year epidemics of this flea occurred in the houses and yards of several residents in Honolulu. This is not the first time we have observed such outbreaks. Usually an entomologist can remedy such a difficulty. The necessary procedure, based on his knowledge of flea habits, is comparatively simple, providing

it is thoroughly executed. But competent men are not always available to offer such help. We believe a time is approaching when more entomologists should be employed in the Territory whose duties will more closely relate to the many miscellaneous insect pests of the general community, such as fleas, roaches, silverfish, ants, etc.

Hibiscus White Fly (*Aleyrodes hibisci* Kotinsky). Hibiscus hedges are often seriously injured by this insect in Honolulu. Though not known outside Hawaii it is considered an immigrant. Should its original habitat ever come to light an excellent opportunity becomes open for a study and introduction to Hawaii of its natural enemies. Positive records of its host plants here are needed. We doubt if any attempts have been made towards control by artificial means. Very few aleyrodids have been recorded in Hawaii. The study and identification of our species, all of which are probably immigrant, will very possibly reveal several species not previously recorded here.

Carpenter Bee (*Xylocopa varipuncta* Patton). No parasites or other natural enemies have yet been imported to check this immigrant American bee though bees of this genus are known to have definite parasites in their native habitats. In view of the considerable damage caused through its borings in telephone poles, fenceposts and buildings, particularly where California redwood is used, a need for parasitic control is strongly indicated.

Control methods, parasitic or artificial, are yet to be found and are in demand for two other insects destructive to wood in Hawaii. We refer to the bostrichid beetle (*Sinoxylon conigerum* Gerst.) and the algaroba beetle (*Cyllene crinicornis* Chevr.). These have been credited during the year with injury to firewood of sufficient magnitude to result in an appeal for help. A fruitful subject deserving more attention for some local entomologist would be a study of insects associated with dead wood in Hawaii.

Fuller's Rose Beetle (*Pantomorus godmani* [Crotch]). This American insect disfigures many shrubs and other plants. We have no parasites for it in Hawaii and very little has been done respecting its biology here. It is quite probable that natural enemies will ultimately be found in Central America that will be useful against it if search is made for them.

Grasshoppers (*Atractomorpha ambigua* Bolivar and *Oxya chinensis* [Thun.]). Our two Acrididae are both foreign and do their fair share of damage to many ornamentals in gardens; the latter including rice and sugar cane in its miscellaneous fare. One egg parasite has been imported and established on the Oxya but is not sufficiently effective to date. A complex of several parasites or other natural enemies for both would fill a much felt want. No attempt has yet been made to check these grasshoppers by artificial means excepting by removal of their favored grass or weed hosts where other plants are cultivated.

The Rose Beetle (*Adoretus sinicus* Burm.). There are few property owners in Hawaii today who have not at some time had occasion to protest over the ragged, unsightly appearance of some coveted tree, shrub or other garden plants, their grape arbors or perhaps their vegetable gardens. A great deal of such damage, discontinuous in nature, can generally be ascribed to the adult *Adoretus sinicus*. Some parasitic control has already been accomplished; but much remains to be done before a satisfactory check is effected. No entomologist has yet given us a sufficiently detailed account of its life history and habits and the field of study in the use of repellants, attractants and poisons is still mostly an untouched one.

Green Coffee Scale (*Coccus viridis* [Green]). This scale often becomes literally plastered over all parts of certain plants, particularly coffee, citrus species and one of our best ornamentals (*Ixora macrothyrsa* Teijsmann and Binnendijk). Though some predacious and parasitic enemies, combined with an important fungus disease, at times play a large part in checking this coccid, the control is sporadic and the scale frequently gains sufficient headway to prove almost fatal to its favored host plants.

Another Coccid, the soft Black Scale (*Saissetia nigra* Nietn.), increases to destructive numbers on many plants in Hawaii. Here again parasites and predators, plus a fungus, operate with effectiveness at times; but not to the satisfaction of the layman, who is only aware of and concerned in the status of an insect pest during those periods when natural control factors are at a low ebb and the pest abundant. Soft scales are amenable to control by sprays. We have done little towards systematizing or standardizing spray formulae and schedules for application against our soft scales and

mealybugs that affect the many ornamentals and garden plants which thrive in these islands. Treatments effective on the mainland may need modification under our semitropical conditions. Here is plenty of opportunity for useful work by an ambitious entomologist. I doubt if any of us have attempted artificial control measures against some of our Diaspine scales also. Work on the Florida Red Scale, *Chrysomphalus aonidum* Linn., so common on palms, Cycads and citrus trees, would be a good beginning. The clear-cut results attending the artificial control measures perfected by Dr. Walter Carter against the pineapple mealybug *Pseudococcus brevipes* (Ckll.), strikingly suggest what may be accomplished in the insecticidal control of a fair number of coccids tolerated unnecessarily in most of our gardens.

The Coconut Leaf Roller (*Omiodes blackburni* [Butl.]) is another insect which attracts wide attention in Hawaii because of the unsightly appearance of most of our coconut palms resulting from heavy infestations by the larvae of this moth. Of late years many of the palms of Honolulu have been particularly free from this damage. This has evidently been caused by heavy parasitism amongst the eggs and larvae. A complete study of this notorious coconut pest with the object of clarifying our present understanding of the control factors would be a worthy undertaking. It is also possible that the foliage of young trees, conveniently reached by poison dusts or sprays may be protected after a proper investigation into the merits of such treatment has been made.

On the economic side there are still other problems in which the community will require the aid of the trained entomologist. The work of the Anti-mosquito League, so well begun a few years ago, has gone far in the suppression of mosquitos about Honolulu. It should and probably will continue to function. We are doing very little to help the local vegetable gardeners. Frequent and comprehensive surveys of the pests with which they are concerned will need to be made sooner or later, with the object both of determining what insects are present and what remedial measures can be applied. The recent arrival of the pepper weevil, *Anthonomus eugenii* Cano, in our Territory and the disastrous effect it has had upon the chili peppers in Honolulu gardens, offers an excellent problem for the future in a study of its natural

enemies in Mexico, with the object of their introduction to Hawaii if found.

The necessary support and confidence of the general public will always be difficult of attainment unless we give full attention and some definite relief to the many minor as well as major pests that come to their notice.

There is much yet to be done with our native Hawaiian insects, especially with respect to their biologies and hosts. We learn from those best informed on the endemic insects of Hawaii that a great deal is still unknown concerning parasites of our insect fauna. A study of all the insects associated with any given host plant or special environment results in much that is new, as evidenced by the many interesting published records occurring in our "Proceedings." Most of us visit our mountains but rarely; some perhaps feeling that our scanty indigenous fauna leaves little still unrecorded. We have abundant proof to the contrary from the unfailing reports, month by month, that are given by the few enthusiasts of our Society who periodically brave our trails to return with something new.

We must never shelve into the background the importance of systematic work. The correct identity of every insect in the Territory is of the greatest importance. It is hardly necessary to state that each and every achievement in the biological control of insect pests here has been accomplished only after the systematist has first correctly established the identity of the insect in question.

From our viewpoint the Bishop Museum is becoming increasingly important as the logical repository for our Pacific Island and Hawaiian insect collections. Substantial additions have been made through the recent work of the Pacific Entomological Survey and without question much more material will be added from time to time, either by organized surveys or through contributions made by individual members of this Society. A year seldom if ever passes without one or more of this group visiting some of the other Pacific Islands either for business or pleasure and returning to further enrich our collections and knowledge of Pacific insect faunas. In view of the magnitude and economic importance of these growing collections and the unending work involved in their proper ordering and maintenance, a full time curator of insects at

the Bishop Museum, with few, if any, other duties, is badly needed. It will be gratifying to those in Hawaii who appreciate the importance of entomology in the Pacific when such an appointment is made.

Our Society is to be congratulated on the attendance at the monthly meetings throughout the year and on the many interesting and valuable contributions presented for publication in our Proceedings. It is sincerely hoped and believed that we will continue to grow and prosper and keep up the high standard of work which has so characterized the patient endeavors of our members for the past 29 years.